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10/571,140	03/09/2006	Fumihiko Yaguchi	0038-0491PUS1	3933
2292 7590 05/13/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER BOBISH, CHRISTOPHER S				
ART UNIT 4135		PAPER NUMBER		
NOTIFICATION DATE 05/13/2008		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/571,140

Applicant(s)

YAGUCHI ET AL.

Examiner

CHRISTOPHER BOBISH

Art Unit

4135

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2006.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-10 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 09 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-85/86)
Paper No(s)/Mail Date 03/09/2006
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Specification

The abstract of the disclosure is objected to because it is more than one paragraph long. Applicant is reminded of the proper language and format for an abstract of the disclosure. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Hirabayashi (European Patent Application No. 0605903 A1).

Hirabayashi teaches:

limitations from claim 1, a method of driving an electromagnetic pump that conveys a fluid from a pump chamber, **FIG. 1 (2) C. 4 Lines 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder and passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move, **C. 1 Lines 34-36**, the plunger in the axial direction inside the cylinder, wherein a pulse voltage is applied alternately on a positive side and a negative side to drive the electromagnetic coil such that a change in voltage that occurs when the polarity of the pulse voltage is inverted has a continuous slope at least between the positive side and the negative side; **C. 2 Lines 43-45**, the plunger (magnetic body, 10) is reciprocated by supplying an AC voltage which is known to have a continuous slope and also will have an alternating positive and negative side, it is inherent that the change in voltage will have a continuous slope when using AC voltage;

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi (European Patent Application No. 0605903 A1).

limitations from claim 2, a method of driving an electromagnetic pump according to Claim 1, wherein a sinewave-shaped pulse voltage is applied to drive the electromagnetic coil, **it would be obvious to one having ordinary skill in the art that an AC voltage is capable of, and is most likely to have a sine wave shape, providing a smooth and continuous power source;**

Hirabayashi does not teach the voltage driving range given in claim 3 below;

limitations from claim 3, a method of driving an electromagnetic pump according to Claim 1, wherein a driving voltage $V(t)$ is applied in a range provided by Equation (1) below where a maximum value of the driving voltage $V(t)$ applied to the electromagnetic coil is set at V_{max}
 $0.8 * V_{max} * \sin(wt) < V(t) < 1.5 * V_{max} * \sin(wt) \dots$ Equation (1) (where t : time and w : angular velocity).

However it would have been an obvious design choice to use voltages within these parameters. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi (European Patent Application No. 0605903 A1), in view of Hitoo et al (Japanese Publication No. 09-126147).

A translated abstract is used to cite Hitoo in this office action.

Claim 4;

Hirabayashi teaches:

a method of driving an electromagnetic pump that conveys a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder and passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder **C. 1 Lines 34-36**; and a pulse current flows where a change in current that occurs when the polarity of the current is inverted has a continuous slope at least between the positive side and the negative side, **C. 6 Lines 6-9**, **the plunger (magnetic body, 10) is reciprocated by supplying an alternating current which is known to have a continuous slope**;

Hirabayashi does not teach a method of detecting current supplied to the coils, but Hitoo does.

Hitoo teaches:

wherein the current flowing through the electromagnetic coil is detected, **a current detecting device (4) is discussed in the translated abstract and is shown in the accompanying drawing**;

Hirabayashi and Hitoo teach and disclose the electromagnetic pump of claim 4 and Hirabayashi further teaches:

limitations from claim 5, a method of driving an electromagnetic pump, wherein the current is controlled so that a sinewave-shaped pulse current flows in the electromagnetic coil, **it would be obvious to one having ordinary skill in the art that an alternating current, C. 6 Lines 6-9, is capable of, and is most likely to have a sine wave shape**;

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It would have been obvious to one having ordinary skill in the art at the time of the invention to use the current detecting method and device of Hitoo with the magnetic type pump of Hirabayashi to control the stroke of the piston;

Neither Hirabayashi nor Hitoo disclose the current driving range given in claim 6 below;

limitations from claim 6, a method of driving an electromagnetic pump according to Claim 4, wherein a driving current $I(t)$ is controlled in a range provided by Equation (2) below where a maximum value of the driving current $I(t)$ that flows in the electromagnetic coil is set at I_{max}
 $0.8 * I_{max} * \sin(wt) < I(t) < 1.5 * I_{max} * \sin(wt)$...Equation (2) (where t : time and w : angular velocity).

However it would have been an obvious design choice to use voltages within these parameters. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi (European Patent Application No. 0605903 A1), in view of Kurahashi et al (JP 03- 31913 B2).

A translated abstract is used to cite Kurahashi in this office action.

Claim 7;

Hirabayashi teaches:

a method of driving an electromagnetic pump that conveys a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder and passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder, **C. 1 Lines 34-36**;

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Hirabayashi does not teach a driving voltage or current including a period of zero voltage nor does Hirabayashi teach a minute voltage pulse, but Kurahashi does.

Kurahashi teaches:

a method of driving an electromagnetic pump, **examiner considers a compressor to be equivalent to a pump, it would be obvious to use the method taught by Kurahashi with the magnetic pump of Hirabayashi**, wherein a pulse voltage is applied or a pulse current flows including a period where a voltage or current value is zero when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted; **FIG. 10 included below, shows a period of time labeled where the supplied voltage is zero before the voltage is inverted from positive to negative;**

limitations from claim 8, a method of driving an electromagnetic pump, wherein the pulse voltage is applied or the pulse current flows so that before the period where the voltage or current value is zero, a minute voltage pulse of at least 30% of a maximum voltage is applied or a minute current pulse of at least 30% of a maximum current flows, **FIG. 10 included below and amended by the examiner shows a minute voltage pulse before a period of zero voltage, when the voltage changes polarity there must be a period of zero voltage as it crosses the "0" line; the minute voltage pulse can be seen to be obviously above 30% of the max voltage;**

Claim 9;

Hirabayashi further teaches:

a method of driving an electromagnetic pump that conveys a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder and passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder, **C. 1 Lines 34-36;**

Hirabayashi does not teach an offset voltage, but Kurahashi does.

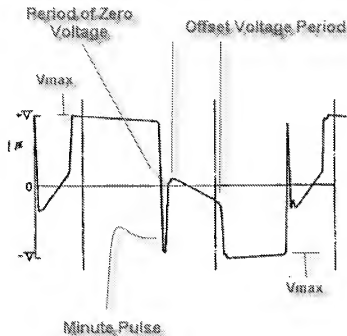
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Kurahashi teaches:

a method of driving an electromagnetic pump, **examiner considers a compressor to be equivalent to a pump, it would be obvious to use the method taught by Kurahashi with the magnetic pump of Hirabayashi**, wherein a pulse voltage is applied or a pulse current flows so that an offset voltage of no greater than 30% of a maximum voltage is applied or an offset current of no greater than 30% of a maximum current flows when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted, **FIG. 10 included below and amended by the examiner shows an offset voltage being applied when the polarity of the driving voltage changes, it does not appear that the offset voltage is ever greater than 30% of the max voltage;**

limitations from claim 10, a method of driving an electromagnetic pump, wherein the pulse voltage is applied or the pulse current flows so that before a period where the offset voltage is applied or the offset current flows, a minute voltage pulse of at least 30% of the maximum voltage is applied or a minute current pulse of at least 30% of the maximum current flows, **FIG. 10 included below and amended by the examiner shows a minute voltage pulse being applied before the offset voltage period;**

It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the driving method of Kurahashi with the magnetic pump of Hirabayashi to reduce vibrations cause by the reciprocating piston when the voltage polarity is switched.



Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kemp et al (United States Patent No. 5,672,950)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER BOBISH whose telephone number is (571)270-5289. The examiner can normally be reached on Monday through Thursday, 7:30 - 5:00, most Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Brewster can be reached on (571) 272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Bobish/
Examiner, Art Unit 4135

/C. B./
Examiner, Art Unit 4135

/Jessica T Stultz/
Primary Examiner, Art Unit 4135